STS 118 Return Samples: Assessment of Air Quality aboard the Shuttle (STS-118) and International Space Station (13A.1)

The toxicological assessments of 2 grab sample canisters (GSCs) and one pair of formaldehyde badges from the Shuttle are reported in Table 1. Analytical methods have not changed from earlier reports. The recoveries of the 3 surrogates (^{13}C-acetone, fluorobenzene, and chlorobenzene) from the 2 GSCs averaged 120, 117, and 122 %, respectively. Three formaldehyde controls averaged 98% recovery. The Shuttle atmosphere was acceptable for human respiration.

Table 1. Analytical Summary of Shuttle Samples

Sample Location	Date of Sample	NMVOCs [a] (mg/m^3)	T Value[b] (units)	Alcohols (mg/m^3)	Formaldehyde ($\mu g/m^3$)
Middeck (preflight)	8/08/07	0.4	0.45[c]	1	--
Flight deck	8/18/07	--			38
Middeck (end mission)	8/21/07	4	0.10	0	--

[a] Non-methane volatile organic hydrocarbons.
[b] Calculated excluding CO_2, formaldehyde, and siloxanes.
[c] A trace of propenal contributed 0.42 units of this value

The toxicological assessment of 8 GSCs and 6 pairs of formaldehyde badges from the ISS is shown in Table 2. The recoveries of the 3 standards (as listed above) from the GSCs averaged 99, 99 and 99%, respectively. Three formaldehyde control badges averaged 98% recovery.

Table 2. Analytical Summary of ISS Results

Module/Sample	Approx. Date	NMVOCs[a] (mg/m^3)	T Value[b] (units)	Alcohols (mg/m^3)	Formaldehyde ($\mu g/m^3$)
SM	6/11/07	4	0.12	3	24
FGB	6/11/07	6	0.16	3	--
Lab	6/11/07	6	0.14	4	32
SM	7/10/07	5	0.66[c]	3	20
FGB	7/10/07	7	0.13	6	--
Lab	7/10/07	4	0.11	3	30
SM	8/2/07	4	0.14	3	20
Lab	8/2/07	4	0.13	3	25
Guideline		*<25*	*<1.0*	*<5*	*<120*

[a] Non-methane volatile organic hydrocarbons.
[b] Calculated excluding CO_2, formaldehyde, and siloxanes.
[c] A trace of propenal contributed 0.42 T units to this value. Other aliphatic aldehydes were slightly above normal levels.

Based on these limited samples, the ISS atmosphere is acceptable for human respiration. The alcohol levels were well controlled throughout the period of sampling.

John T. James

John T. James, Ph.D.
Chief Toxicologist

Enclosures